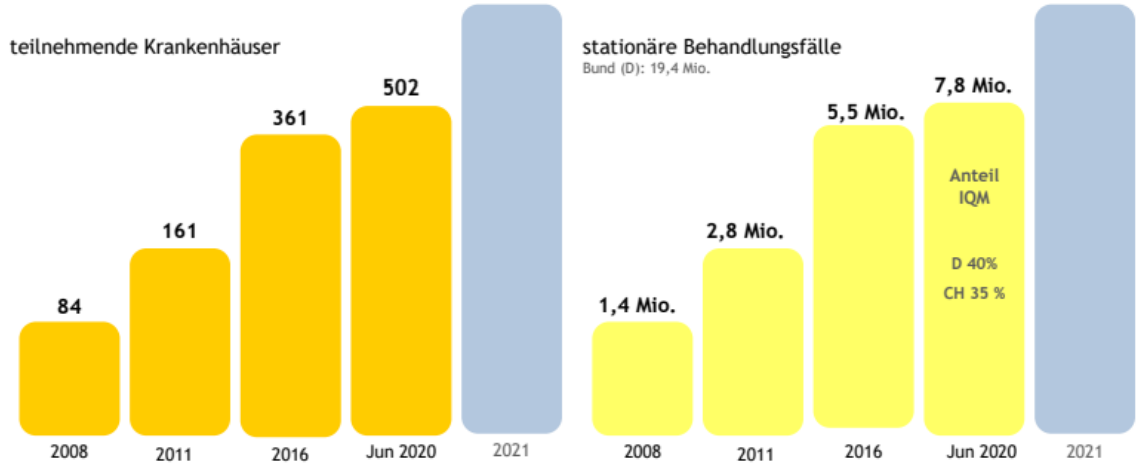
Stationäre Versorgung während der SARS-CoV-2 Pandemie – Analysen mit Routinedaten

- **Ralf Kuhlen**
- **Vorsitzender Wissenschaftlicher Beirat IQM**
- **Medizinischer Geschäftsführer Helios Health**

Routinedaten basierte Analyse der Krankenhausdaten – wer ist IQM

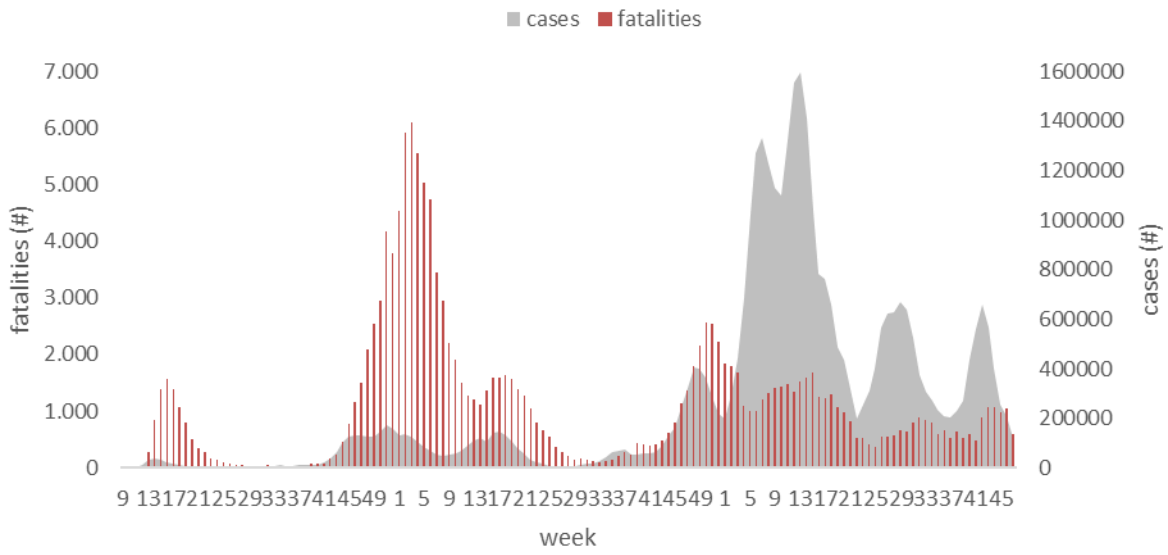
- gemeinnütziger Verein
- Gründung 2008 durch 15 führende KH Träger
- IQM ist offen für alle
- aktives Fehlermanagement (mehr als QS)
- träger- und länderübergreifend
- Hilfe zur Selbsthilfe





Stationäre Versorgung während der SARS-CoV-2 Pandemie – Analysen mit Routinedaten – 2021

Analysezeitpunkte und Teilnehmer



Analyse	Beteiligung	
1. Analyse des Leistungsgeschehens nach 1. Lockdown	310 Krankenhäuser (D)	1
Follow-up Analyse im Rahmen der IQM Gruppenauswertung 1. Halbjahr 2020 (Widerspruch)	459 Krankenhäuser (D+CH)	2
Follow-up in monatlichen Analysen für die IQM Mitglieder (D)	Oktober 278 Krankenhäuser November 284 Krankenhäuser	3
Follow-up Analyse im Rahmen der IQM Gruppenauswertung 2020 (Widerspruch)	431 Krankenhäuser (D+CH)	4
Follow-up in monatlichen Analysen für die IQM Mitglieder (D)	Januar 312 Krankenhäuser Februar 305 Krankenhäuser März 310 Krankenhäuser	5
Follow-up Analyse im Rahmen der IQM Gruppenauswertung 1. Halbjahr 2021	427 Krankenhäuser (D)	6
Follow-up in monatlichen Analysen für die IQM Mitglieder (D)	Oktober 295 Krankenhäuser	7
Follow-up Ganzjahresauswertung 2020	426 Krankenhäuser (D)	8
Follow-up 1. HJ 2022	415 Krankenhäuser (D)	9

Infect Drug Resist 2023 May 8:16:2775-2781. doi:10.2147/IDR.S402313. eCollection 2023.

COVID-19 and Severe Acute Respiratory Infections: Monitoring Trends in 421 German Hospitals During the First Four Pandemic Waves

Johannes Leiner, Sven Hohenstein, Vincent Pellissier, Sebastian König, Claudia Winklmair, Irit Nachtigall, Andreas Bollmann, Ralf Kuhlen; scientific advisory board of the Initiative of Quality Medicine (IQM)

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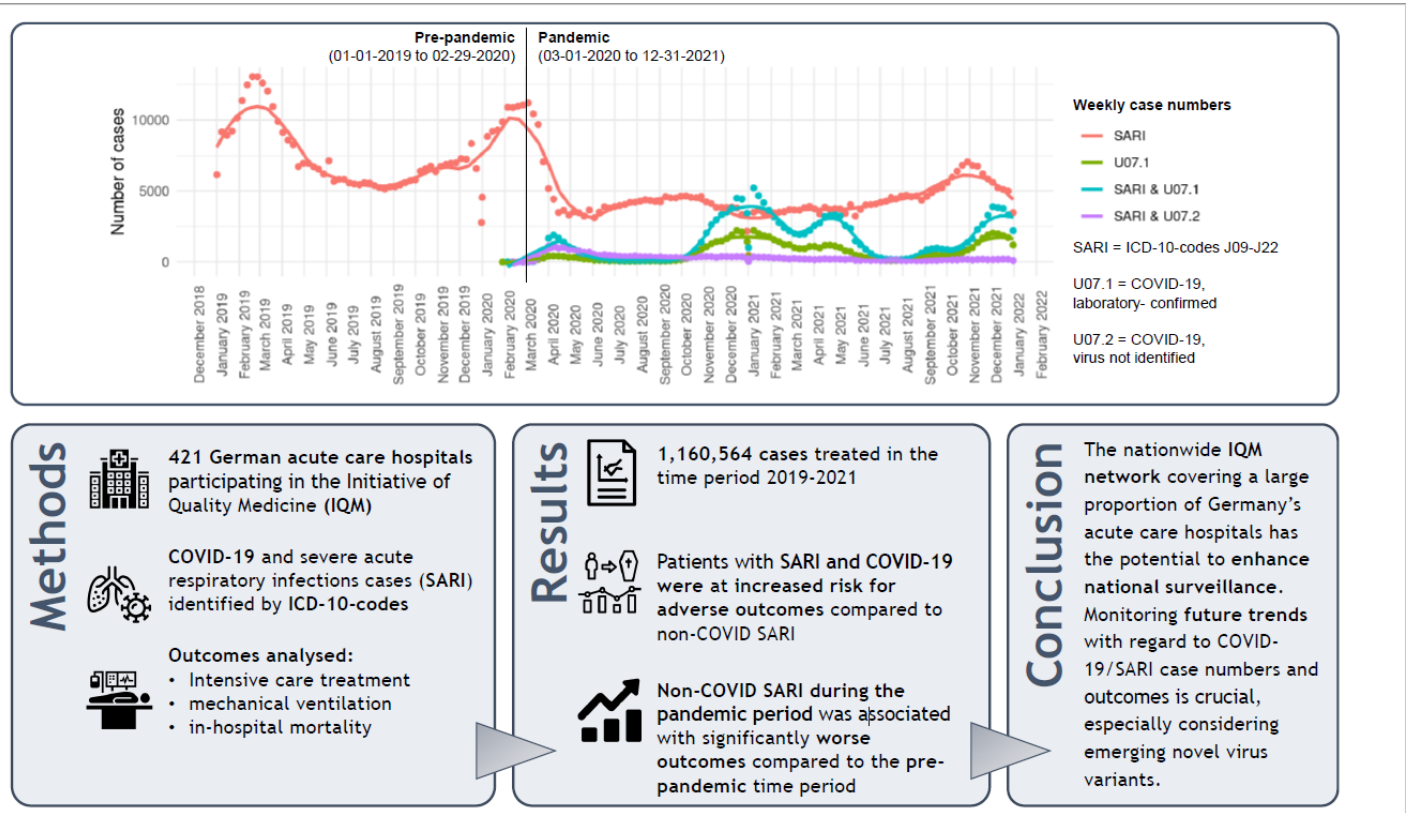
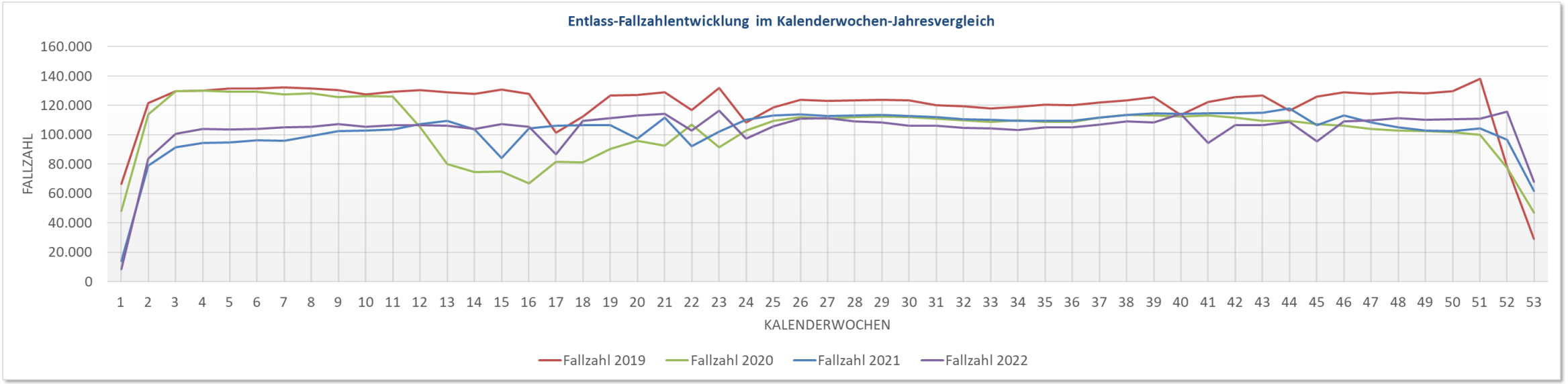


Table 2: Comparison of SARI cases during pre-pandemic and pandemic periods

	Pre-pandemic (01-01-2019 to 03-03-2020)	Pandemic (03-04-2020 to 12-31-2021)	P-value
Case numbers	477,443	432,427	n/a
Average case numbers per month	34,103.07	19,655.77	n/a
Age			
Mean (SD)	63.9 ±27.4	65.2 ±26.0	< 0.01
≤ 59 years	27.9% (133,389)	25.9% (111,940)	< 0.01
60–69 years	14.3% (68,489)	15.8% (68,479)	< 0.01
70–79 years	22.8% (108,731)	22.3% (96,337)	< 0.01
≥ 80 years	34.9% (166,834)	36.0% (155,671)	< 0.01
Sex			
Male	43.5% (207,486)	40.3% (174,085)	n/a
Female	56.5% (269,930)	59.7% (258,295)	< 0.01
	Pre-pandemic	**Pandemic**	**Odds ratio (95%CI); P-value**
Intensive care treatment	21.7% (103,755)	27.6% (119,248)	1.28 (1.26-1.29); < 0.001
Mechanical ventilation	15.2% (72,506)	19.0% (82,058)	1.23 (1.21-1.24); < 0.001
In-hospital mortality	12.0% (57,324)	15.3% (66,166)	1.27 (1.26-1.29); < 0.001

For comparison of patient characteristics, we employed logistic regression for binary variables and linear regression for numeric variables. Comparison of treatments and outcomes (intensive care, mechanical ventilation, in-hospital mortality) was performed via logistic regression, adjusted for age, sex and date to account for yearly seasonal trends. SARI = Severe acute respiratory infections.

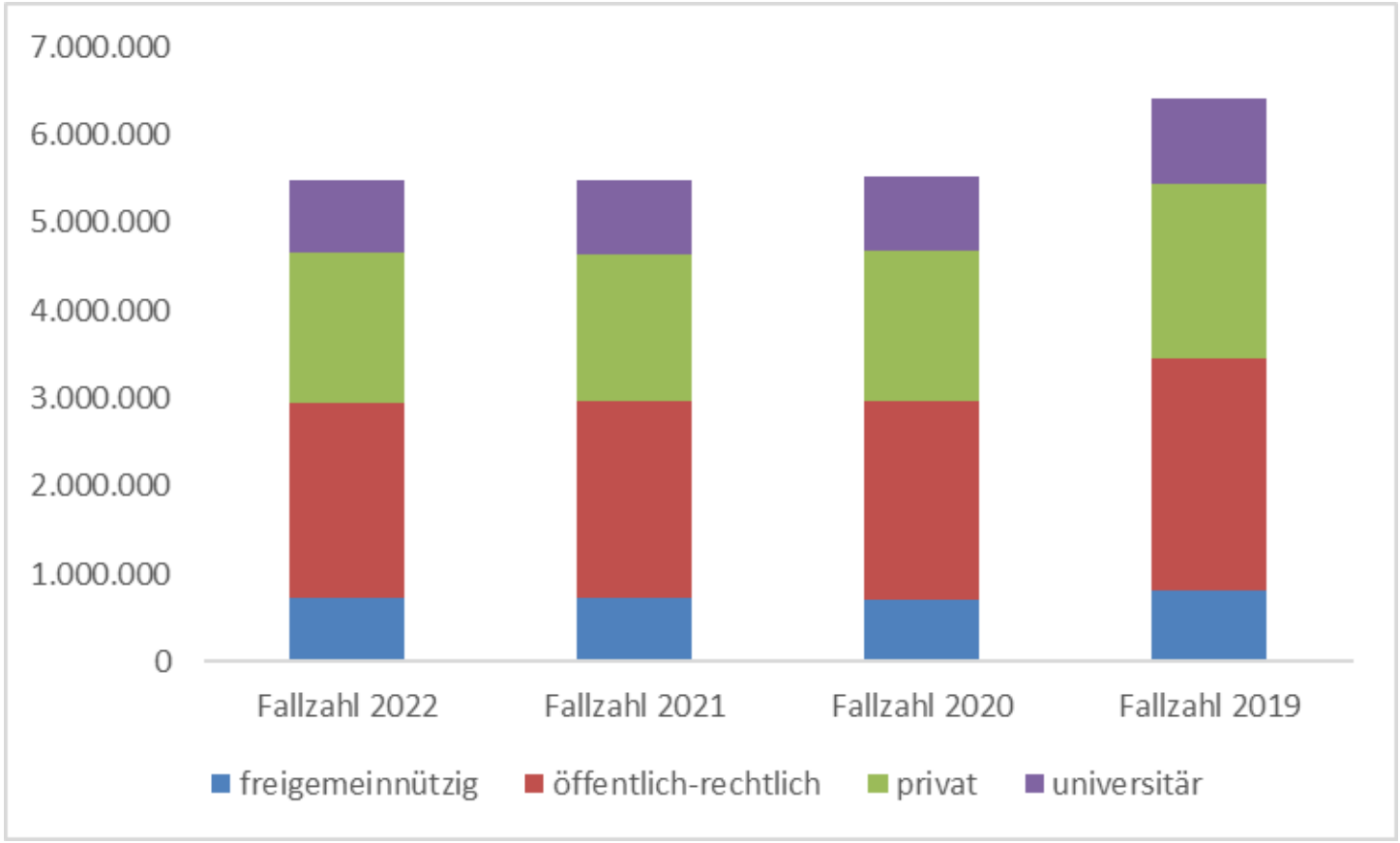
Wöchentlicher Fallzahlverlauf 2019 - 22 in 386 IQM Krankenhäusern



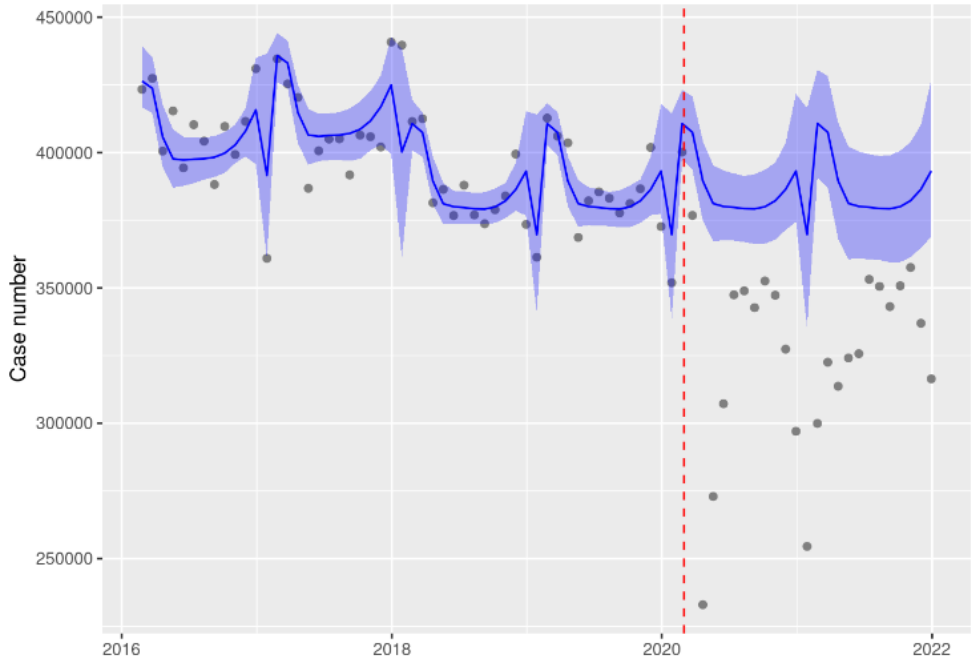
Stationäre Versorgung während der SARS-CoV-2 Pandemie –

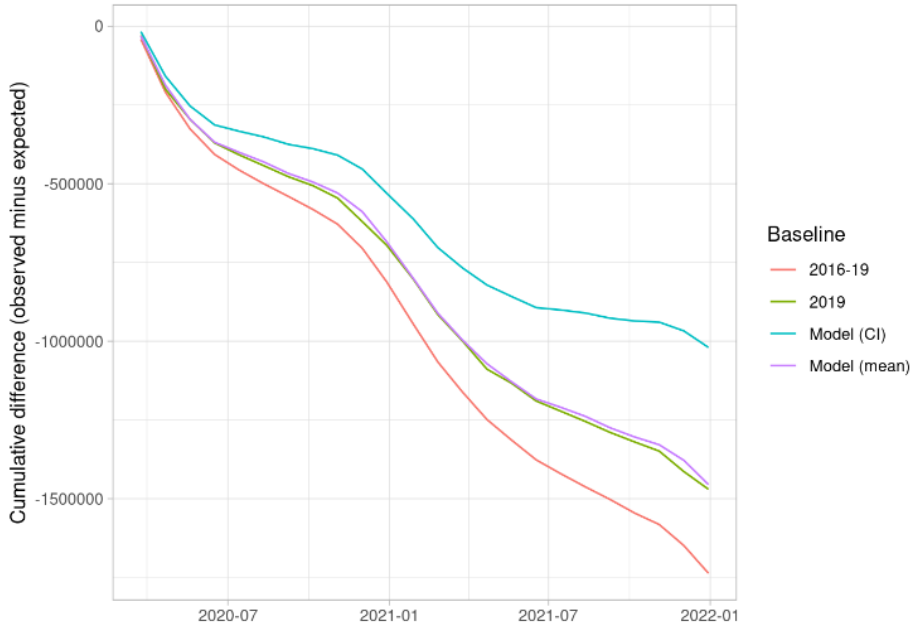
Analysen mit Routinedaten – 2022

Anzahl der teilnehmenden Krankenhäuser und deren Fallzahlen nach IQM Trägergruppen



Fallzahlverlauf 2016 - 22

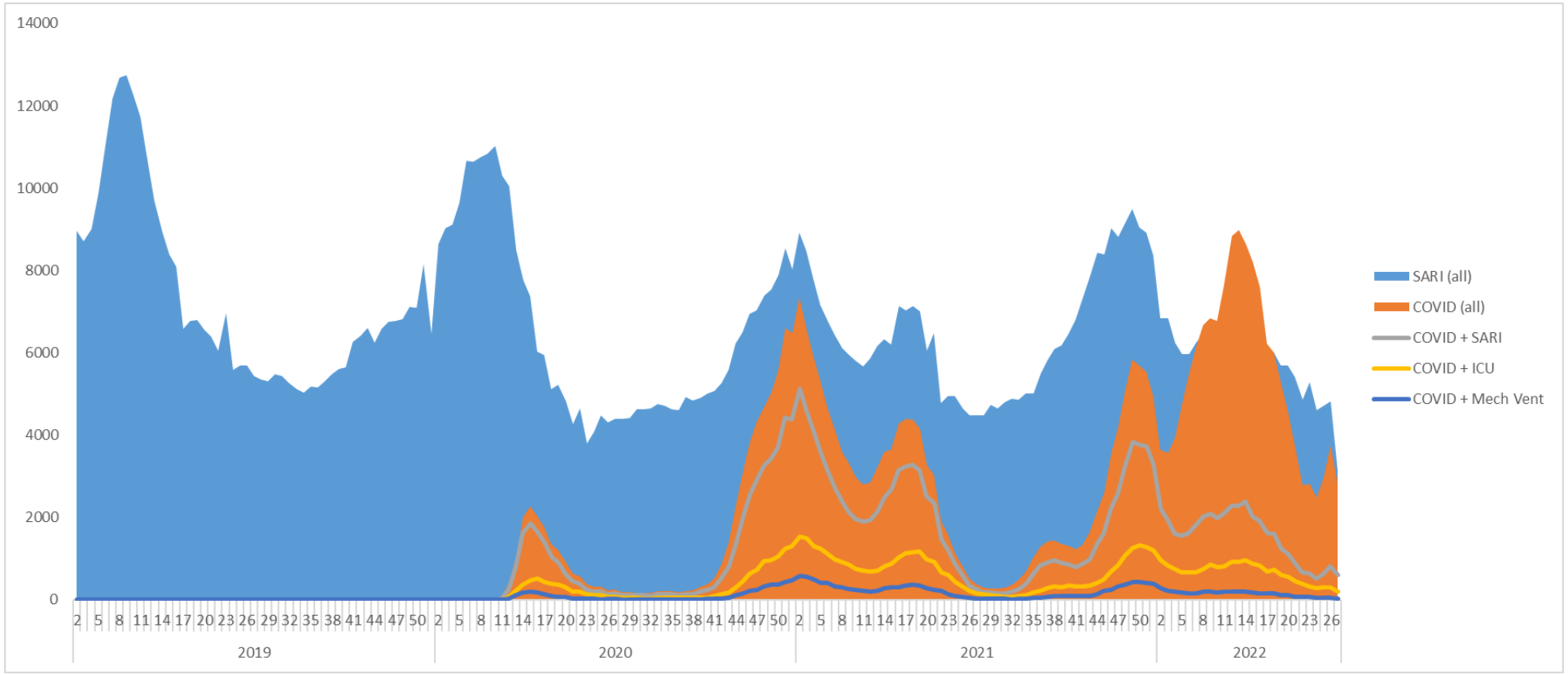




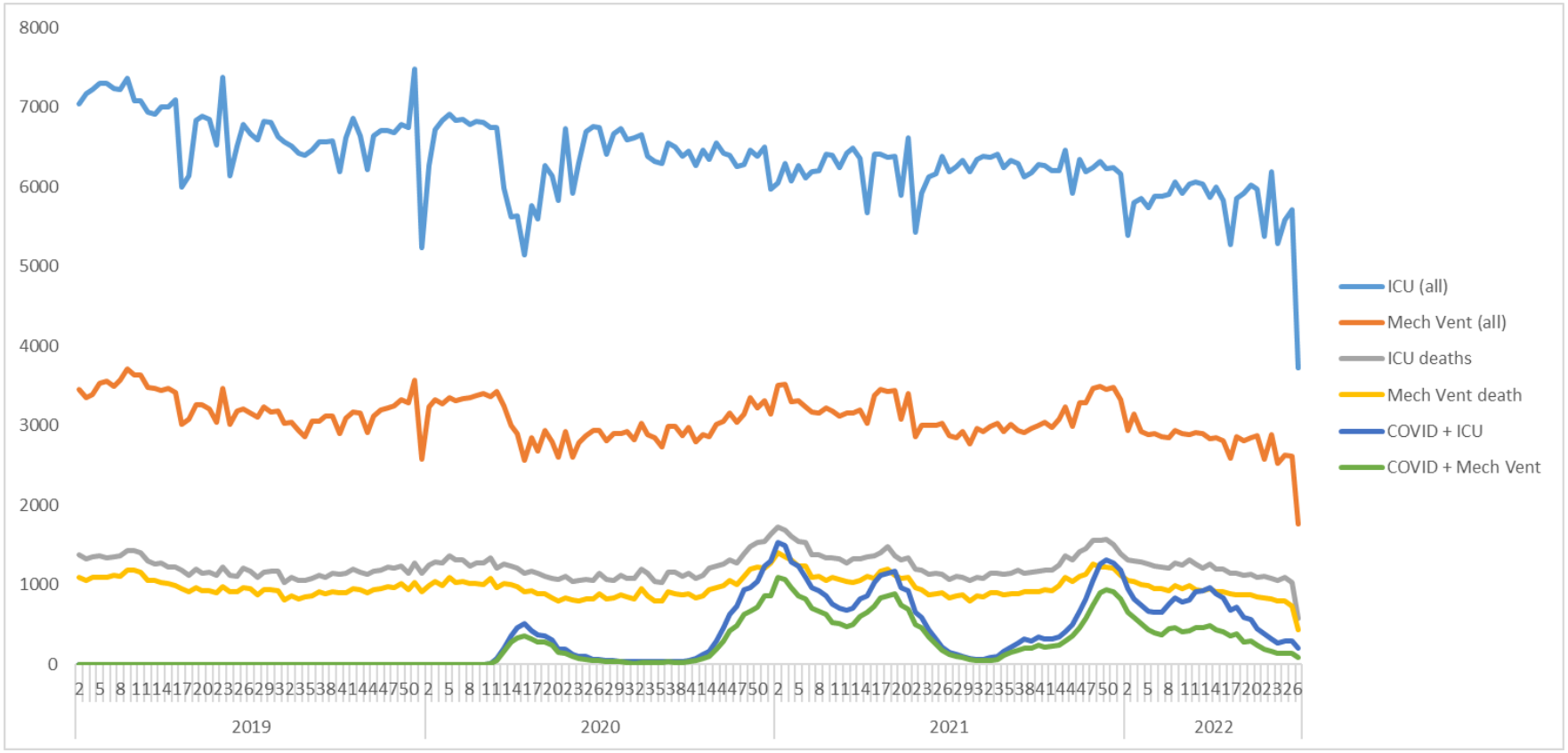
Stationäre Versorgung während der SARS-CoV-2 Pandemie –

Analysen mit Routinedaten – 1 HJ 2022

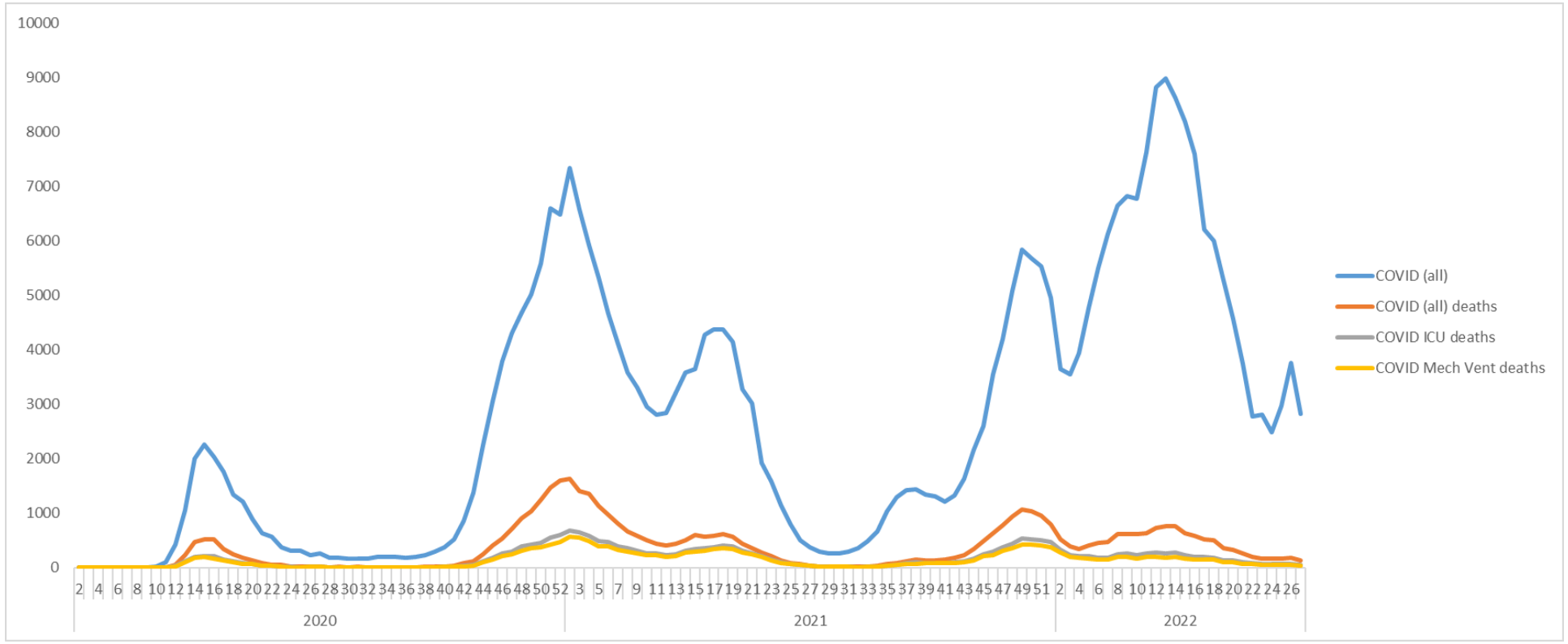
Wöchentlicher Anzahl der SARI Fälle, COVID Fälle und deren Krankenhausverlauf 2019-1HJ 22 in 415 IQM Krankenhäusern



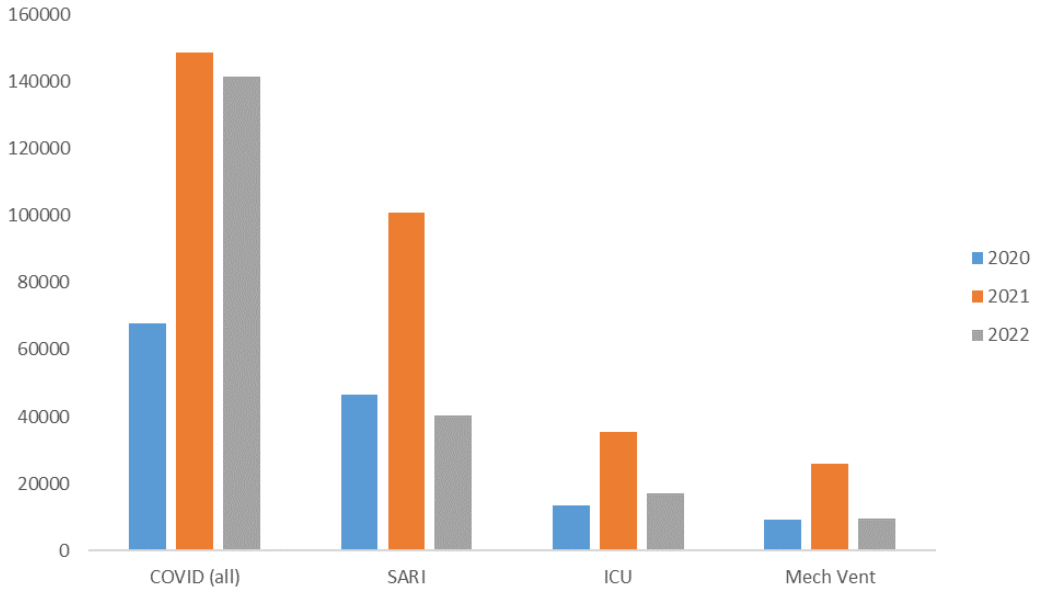
Wöchentliche Anzahl und Verlauf aller Intensiv- und Beatmungsfälle, sowie der COVID Fälle 2019-1HJ 22 in 415 IQM Krankenhäusern



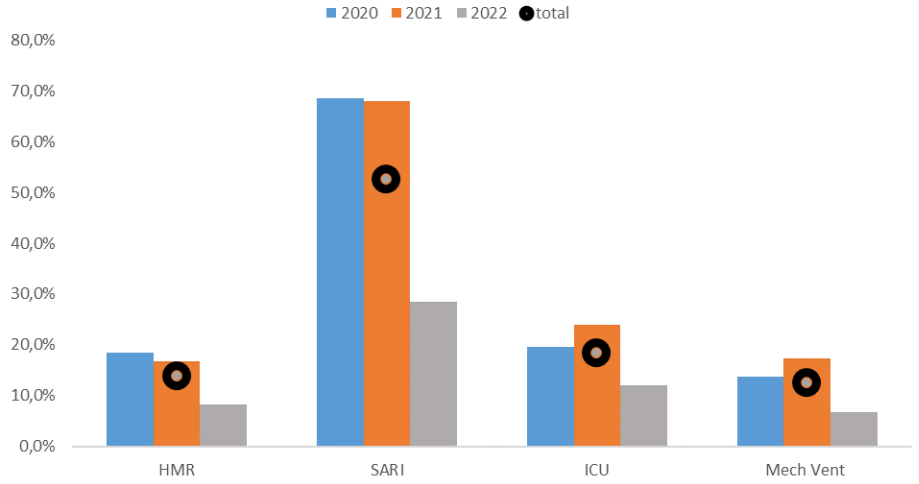
Anzahl und Todesfälle aller stationären COVID Fälle, und der Intensiv- und Beatmungsfälle im Verlauf der Pandemie in 415 IQM Krankenhäusern

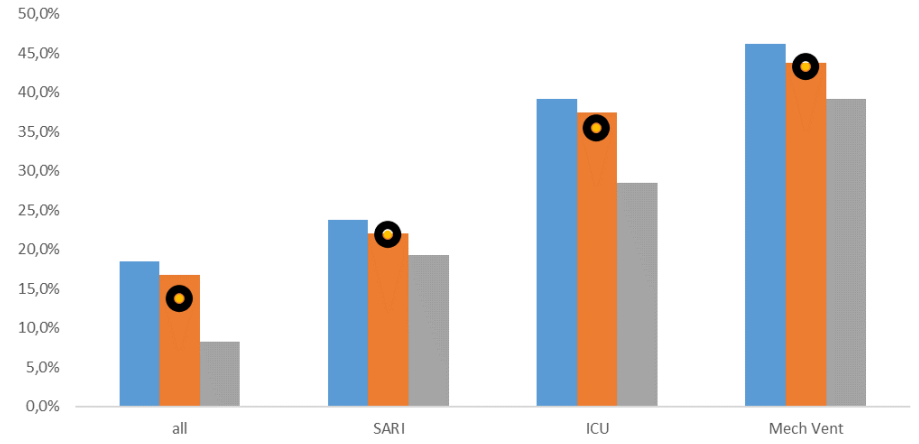


Stationäre Versorgung während der SARS-CoV-2 Pandemie – Analysen mit Routinedaten – 2022



	Fälle (%)	Verstorbene (%)
COVID (U07.1)	358.165	49.205 (13,7%)
SARI	188.002 (52,5%)	41.141 (21,9%)
INT	65.954 (18,4%)	23.391 (35,5%)
Beatmung	44.664 (12,5%)	19.325 (43,3%)

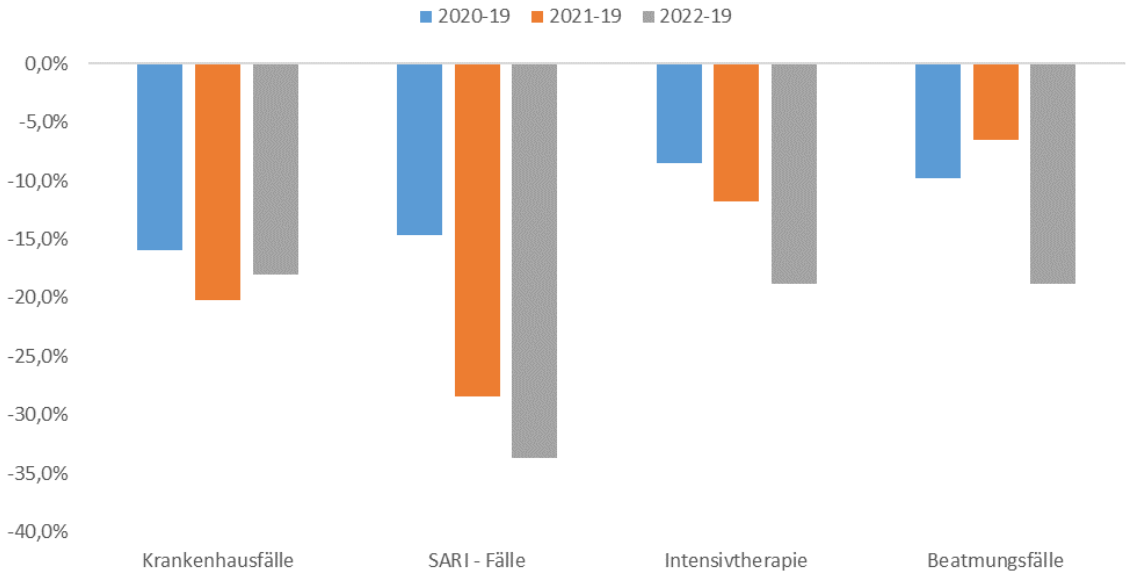




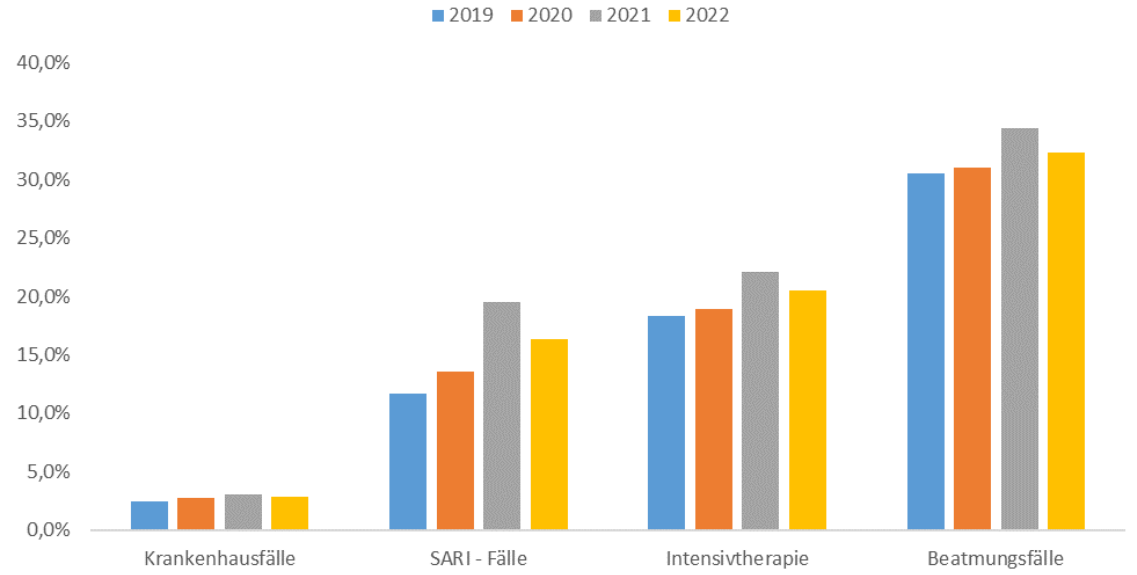
Stationäre Versorgung während der SARS-CoV-2 Pandemie –

Analysen mit Routinedaten – 1 HJ 2022

% Änderung und Sterblickeit aller stationären Fälle, SARI-, Intensiv- und Beatmungsfälle verglichen 2019-1HJ 22 in 415 IQM Krankenhäusern



Fallzahlvergleich zu 2019



Krhs.-sterblichkeit 2019-1HJ2022

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Original Investigation | Public Health

A Comparative Analysis of In-Hospital Mortality per Disease Groups in Germany Before and During the COVID-19 Pandemic From 2016 to 2020

Sebastian König, MD; Vincent Pellissier, PhD; Sven Hohenstein, PhD; Johannes Leiner, MD; Gerhard Hindricks, MD; Andreas Meier-Hellmann, MD; Ralf Kuhlen, MD, PhD; Andreas Bollmann, MD, PhD

Abstract

IMPORTANCE Throughout the ongoing SARS-CoV-2 pandemic, it has been critical to understand not only the viral disease itself but also its implications for the overall health care system. Reports about excess mortality in this regard have mostly focused on overall death counts during specific pandemic phases.

OBJECTIVE To investigate hospitalization rates and compare in-hospital mortality rates with absolute mortality incidences across a broad spectrum of diseases, comparing 2020 data with those of prepandemic years.

DESIGN, SETTING, AND PARTICIPANTS Retrospective, cross-sectional, multicentric analysis of administrative data from 5 821 757 inpatients admitted from January 1, 2016, to December 31, 2020, to 87 German Helios primary to tertiary care hospitals.

EXPOSURES Exposure to SARS-CoV-2.

MAIN OUTCOMES AND MEASURES Administrative data were analyzed from January 1, 2016, to March 31, 2021, as a consecutive sample for all inpatients. Disease groups were defined according to *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (*ICD-10*; German modification) encoded main discharge diagnoses. Incidence rate ratios (IRRs) for hospital admissions and hospital mortality counts, as well as relative mortality risks (RMRs) comparing 2016-2019 with 2020 (exposure to the SARS-CoV-2 pandemic), were calculated with Poisson regression with log-link function.

RESULTS Data were examined for 5 821 757 inpatients (mean [SD] age, 56.4 [25.3] years; 51.5% women), including 125 807 in-hospital deaths. Incidence rate ratios for hospital admissions were associated with a significant reduction for all investigated disease groups (IRR, 0.82; 95% CI, 0.79-0.86; $P < .001$). After adjusting for age, sex, the Elixhauser Comorbidity Index score, and SARS-CoV-2 infections, RMRs were associated with an increase in infectious diseases (RMR, 1.28; 95% CI, 1.21-1.34; $P < .001$), musculoskeletal diseases (RMR, 1.19; 95% CI, 1.04-1.36; $P = .009$), and respiratory diseases (RMR, 1.09; 95% CI, 1.05-1.14; $P < .001$) but not for the total cohort (RMR, 1.00; 95% CI, 0.99-1.02; $P = .66$). Regarding in-hospital mortality, IRR was associated with an increase within the *ICD-10* chapter of respiratory diseases (IRR, 1.28; 95% CI, 1.13-1.46; $P < .001$) in comparing 2020 with 2016-2019, in contrast to being associated with a reduction in IRRs for the overall cohort and several other subgroups. After exclusion of patients with SARS-CoV-2 infections, IRRs were associated with a reduction in absolute in-hospital mortality for the overall cohort (IRR, 0.78; 95% CI, 0.72-0.84; $P < .001$) and the subgroup of respiratory diseases (IRR, 0.83; 95% CI, 0.74-0.92; $P < .001$).

(continued)

Key Points

Question What association does the COVID-19 pandemic have with inpatient care in different disease groups?

Findings In this cross-sectional study of 5 821 757 inpatients' administrative data, hospital admission rates were lower for all investigated disease groups in 2020 compared with previous years. Despite higher relative mortality in some subgroups, a higher absolute incidence of in-hospital deaths was observed only for respiratory diseases, which was associated with patients with SARS-CoV-2 infections.

Meaning In 2020, a higher absolute in-hospital mortality was observed only in patients with respiratory diseases, but not in other disease groups or overall.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

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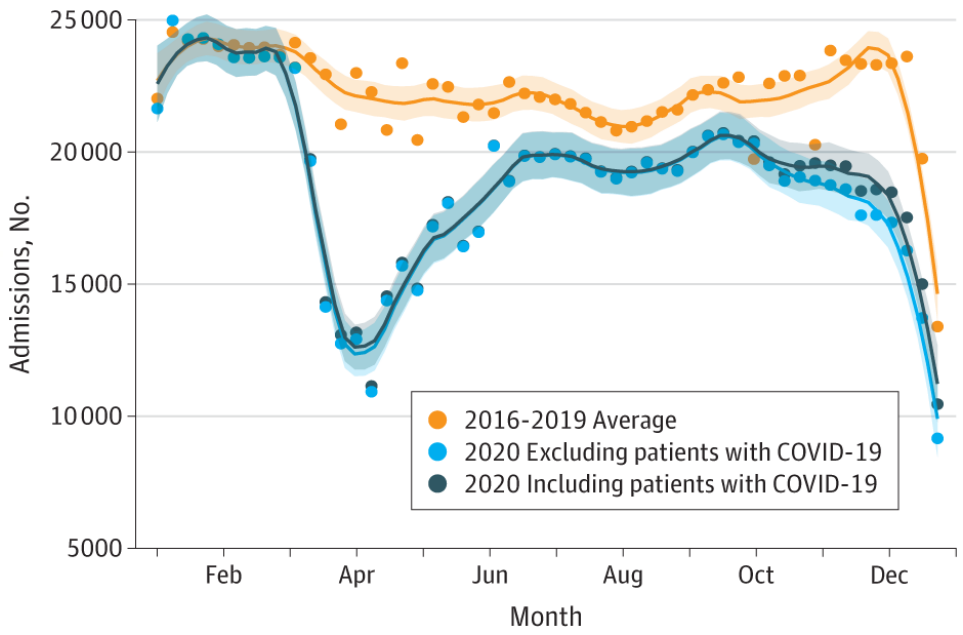


Table 1. Incidence Rate Ratios (IRRs) for Hospital Admissions Comparing the Average of 2016-2019 With That of 2020

	Hospital admissions	
ICD-10 chapter	IRR (95% CI)[a]	*P* value[b]
Total cohort	0.82 (0.79-0.86)	<.001
Certain infectious and parasitic diseases	0.63 (0.59-0.67)	<.001
Neoplasms	0.83 (0.77-0.89)	<.001
Diseases of the blood and blood-forming organs and certain disorders involving the immune system	0.88 (0.83-0.93)	<.001
Endocrine, nutritional, and metabolic disorders	0.83 (0.77-0.90)	<.001
Mental, behavioral, and neurodevelopmental disorders	0.76 (0.70-0.83)	<.001
Diseases of the nervous system	0.66 (0.58-0.76)	<.001
Diseases of the circulatory/cardiovascular system	0.76 (0.69-0.83)	<.001
Diseases of the respiratory system	0.77 (0.71-0.83)	<.001
Diseases of the digestive system	0.80 (0.73-0.87)	<.001
Diseases of the skin and subcutaneous tissue	0.77 (0.72-0.82)	<.001
Diseases of the musculoskeletal system and connective tissue	0.79 (0.73-0.85)	<.001
Diseases of the genitourinary system	0.85 (0.79-0.91)	<.001
Other diseases	0.82 (0.78-0.87)	<.001

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From: **A Comparative Analysis of In-Hospital Mortality per Disease Groups in Germany Before and During the COVID-19 Pandemic From 2016 to 2020**

JAMA Netw Open. 2022;5(2):e2148649. doi:10.1001/jamanetworkopen.2021.48649

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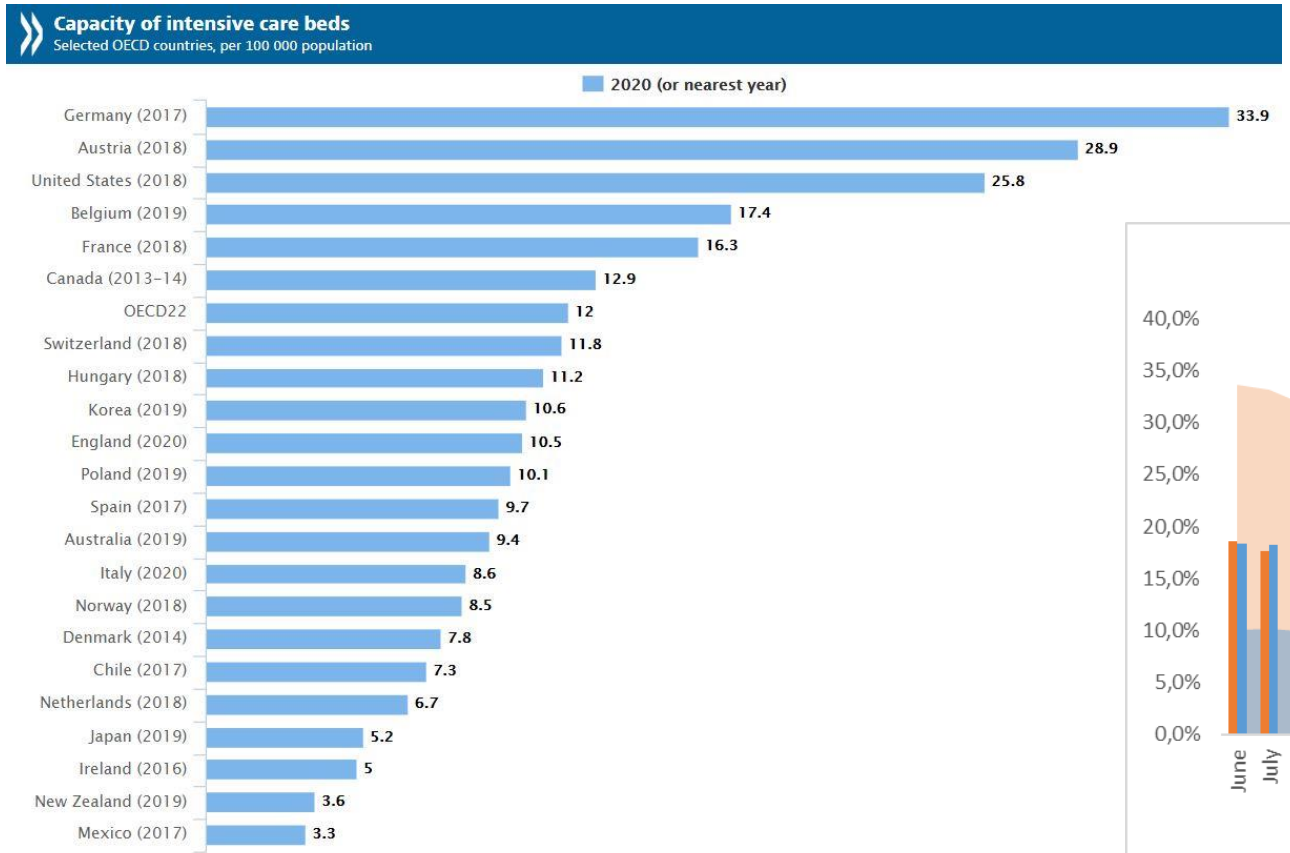
Table 2. Unadjusted and Adjusted Relative Mortality Risks (RMRs) per *ICD-10* Chapter Comparing 2016-2019 With 2020

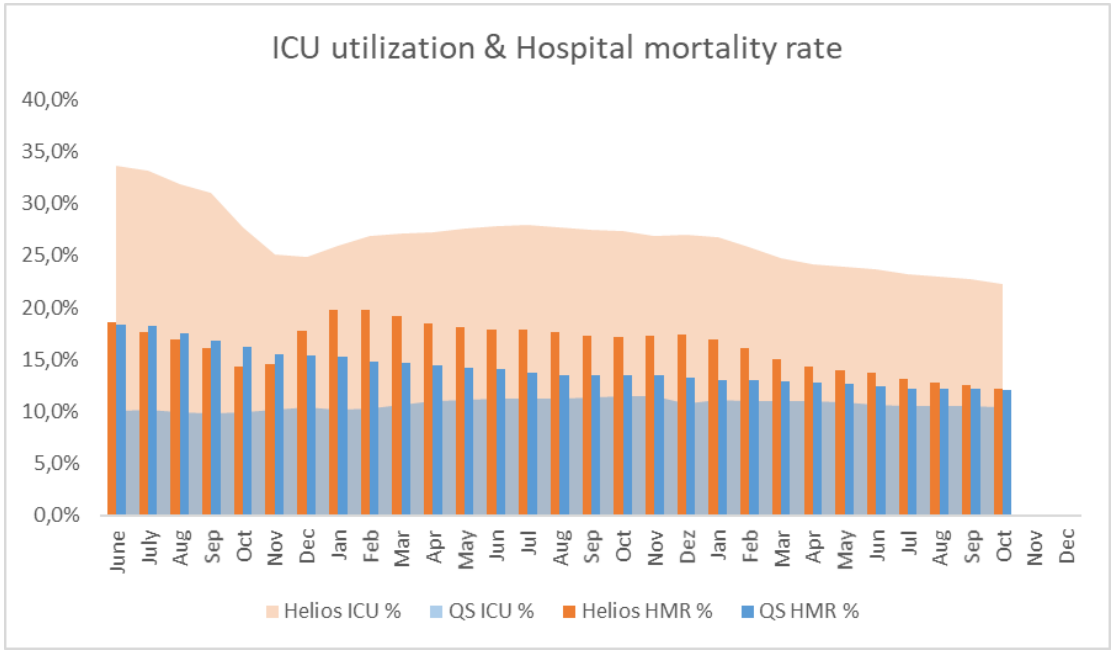
	Unadjusted RMRs		RMRs adjusted for age, sex, and Elixhauser Comorbidity Index score		RMRs adjusted for age, sex, Elixhauser Comorbidity Index score, and SARS-CoV-2 infections	
ICD-10 chapter	RMR (95% CI)	*P* value	RMR (95% CI)	*P* value	RMR (95% CI)	*P* value
Total cohort	1.15 (1.13-1.16)	<.001[a]	1.09 (1.08-1.11)	<.001[a]	1.00 (0.99-1.02)	.66
Certain infectious and parasitic diseases	1.40 (1.33-1.47)	<.001[a]	1.32 (1.25-1.39)	<.001[a]	1.28 (1.21-1.34)	<.001[a]
Neoplasms	1.01 (0.98-1.04)	.63	0.99 (0.96-1.03)	.73	0.98 (0.95-1.01)	.12
Diseases of the blood and blood-forming organs and certain disorders involving the immune system	1.11 (0.92-1.34)	.29	1.09 (0.90-1.31)	.39	1.03 (0.85-1.25)	.77
Endocrine, nutritional, and metabolic disorders	1.02 (0.93-1.11)	.73	0.98 (0.90-1.07)	.72	0.95 (0.87-1.04)	.25
Mental, behavioral, and neurodevelopmental disorders	1.11 (0.93-1.32)	.25	1.12 (0.93-1.33)	.23	1.11 (0.93-1.32)	.27
Diseases of the nervous system	1.20 (1.08-1.34)	<.001[a]	1.14 (1.03-1.27)	.02[a]	1.11 (0.99-1.24)	.06
Diseases of the circulatory/cardiovascular system	1.05 (1.02-1.07)	.001[a]	1.01 (0.98-1.04)	.52	0.99 (0.96-1.02)	.40
Diseases of the respiratory system	1.70 (1.64-1.76)	<.001[a]	1.52 (1.47-1.58)	<.001[a]	1.09 (1.05-1.14)	<.001[a]
Diseases of the digestive system	1.03 (0.98-1.08)	.21	0.95 (0.91-1.00)	.06	0.93 (0.89-0.98)	.003[a]
Diseases of the skin and subcutaneous tissue	1.05 (0.87-1.26)	.64	1.02 (0.85-1.23)	.82	0.97 (0.80-1.18)	.75
Diseases of the musculoskeletal system and connective tissue	1.31 (1.16-1.49)	<.001[a]	1.30 (1.14-1.47)	<.001[a]	1.19 (1.04-1.36)	.009[a]
Diseases of the genitourinary system	1.00 (0.94-1.06)	.98	0.92 (0.86-0.98)	.007[a]	0.88 (0.83-0.94)	<.001[a]
Other diseases	1.10 (1.05-1.15)	<.001[a]	1.06 (1.01-1.11)	.02[a]	0.99 (0.95-1.04)	.77

Abbreviation: *ICD-10, International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (German modification).

[a] Significant *P* value.

ICU capacity as a limitation?





Analyse des COVID-Leistungsgeschehens

2019-22 SARI & SARI U07.1 CH vs D

1.4.1 Weekly case numbers



Figure 1.1: Weekly case numbers.

Table 1.5: Number of hospitals.

Country	Hospitals in IQM	Hospitals in dataset for 2019-2022	Hospitals in country	Proportion
CH	45	41	276	14.86%
D	505	386	1,887	20.46%

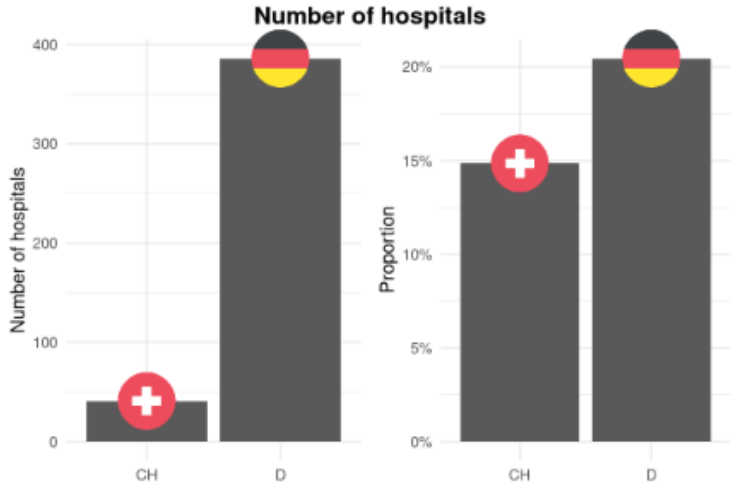


Figure 1.3: Hospitals in dataset.

Submitted for publication

Characteristic	CH, N = 118,851[1]	D, N = 1,303,071[1]	Difference	95% CI[2]	p-value
SARI	89,681 (75%)	1,087,150 (83%)	1.6	1.6, 1.7	<0.001
SARI & U07.1	29,170 (25%)	215,921 (17%)	0.61	0.60, 0.62	<0.001

[1] n (%)
[2] CI = Confidence Interval

Analyse des COVID-Leistungsgeschehens

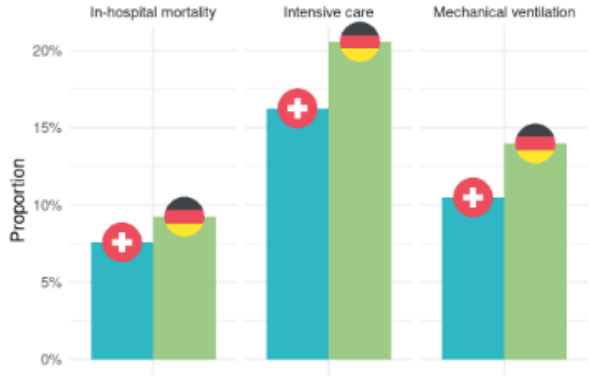
2019-22 SARI & SARI U07.1 CH vs D - Outcomes

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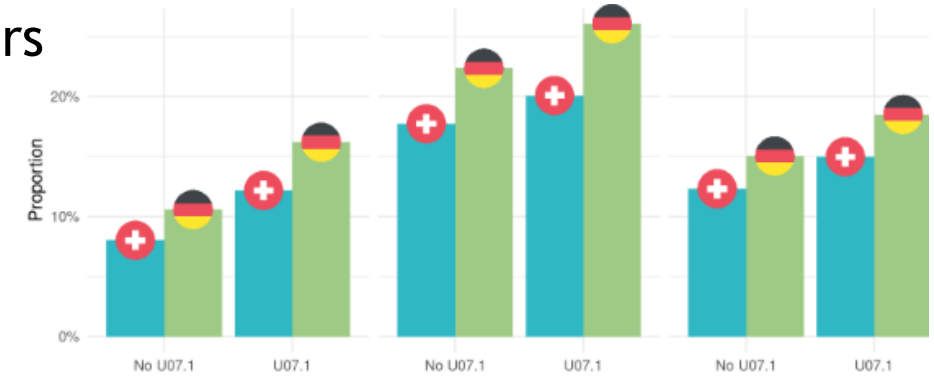
Total cohort



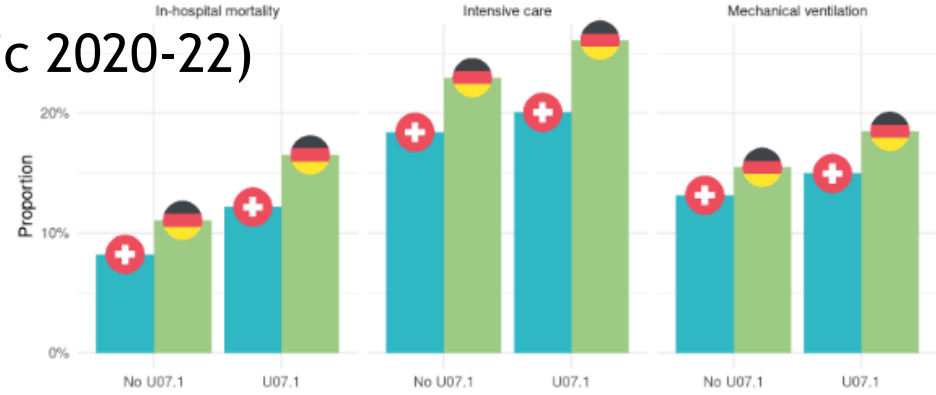
Prä (2019)



Matched pairs



Pandemic 2020-22)



Submitted for publication

Analyse des COVID-Leistungsgeschehens

2019-22 SARI & SARI U07.1 CH vs D - Summary

- Relevante Unterschiede der Patienten Charakteristik, Hospitalbehandlung und Outcomes bei SARI mit und ohne COVID zwischen CH und D
  - Ältere und multimorbidere in D vs. CH
  - Höher Inanspruchnahme INT / maschinelle Beatmung in D vs. CH
  - Höhere Krankenhaussterblichkeit in D vs CH
- „Matched Pairs“ Analyse
  - Vergleichbare Patientencharakteristik
  - Höhere Inanspruchnahme INT / maschinelle Beatmung bleibt bestehen
  - Höhere Krankenhaussterblichkeit auch
- Herangehensweise an Krankenhausaufnahme / INT Therapie / Beatmung in vielen Punkten unterschiedlich
- Weniger Inanspruchnahme INT / Beatmung führt nicht zu weniger Krhs. Sterblichkeit

Submitted for publication

Herzlichen Dank für Ihre Aufmerksamkeit